GREAT LAKES NEARSHORE WATER QUALITY MONITORING AT WATER SUPPLY INTAKES

1976-1981

G.J. Hopkins

Data Report DR 83/101

GREAT LAKES NEARSHORE WATER QUALITY

MONITORING AT WATER SUPPLY INTAKES

1976-1981

by

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Data Report DR83/101

Data Report Series

The data presented in this unreviewed report were collected by staff formerly of the Water Resources Branch of the Ontario Ministry of the Environment as part of the study on nearshore Great Lakes water quality. Every possible effort was made to ensure the accuracy of the information contained in this publication. Verification of any suspect data may be obtained by contacting the author, Laboratory Services and Applied Research Branch, Toronto (416-248-3058).

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PREFACE

A programme to enhance monitoring of nearshore Great Lakes water quality through the use of municipal water intakes was established in 1976. The programme was initiated at eleven Great Lakes locations for which biological monitoring of water quality using phytoplankton measurements was already in place. The main goal of this expanded programme was to monitor the nearshore water quality over a long term (ten years or more) with emphasis on selected trophic state indices. By 1980, an additional six locations had been added (for a total of seventeen) to the programme. This unpublished report provides a description of the programme operation and methodologies. Separate appendices provide a readily available source of basic data collected at each location for the period 1976 to 1981.

The data are periodically submitted to the Surveillance Work-group, International Joint Commission to aid in the assessment of the Great Lakes nearshore water quality. Funding of this study has been provided, in part, through the cost-shared programme of the Canada-Ontario Agreement and the Ontario Ministry of the Environment.

ABSTRACT

Great Lakes Nearshore Water Quality Monitoring at Water Supply Intakes. Data Report 1976-1981

A sampling programme, using eleven Great Lakes municipal water works intakes was established in 1976 for the purpose of measuring chemical and biological water quality of the nearshore waters. The programme was expanded in 1979 and now includes seventeen locations from Thunder Bay on Lake Superior to Brockville on the St. Lawrence River.

Data are available for samples which have been collected at each location on a weekly basis, all year-round. Analyses include twelve water quality parameters with emphasis on trophic state indices such as phosphorus, nitrogen, chlorophyll and phytoplankton. The main goal of the programme is to monitor the nearshore water quality for long term trend analysis. This report provides a description of the programme operation, methodologies and appendices.

The appendices (in five parts) include weekly raw data for all parameters, monthly means and graphics and have been edited further since previously published reports. No interpretation has been provided for the data presented in this report. The data collected to date have, however, indicated that water supply intakes can be used year-round as a cost-effective means of measuring nearshore Great Lakes water quality. The continuation of this programme will provide useful information, particularly for long term trend analyses.

Hopkins, G.J. 1983. Great Lakes Nearshore Water Quality Monitoring at Water Supply Intakes 1976-1981. Ont. Min. of Envir. Data Report DR83/101.

INTRODUCTION

In 1976, the Ontario Ministry of the Environment expanded its provincial phytoplankton monitoring programme at Great Lakes water supply locations to measure several chemical water quality parameters. The main goal of this expanded intake monitoring programme was to assess the nearshore water quality of the Great Lakes over a long term (ten years or more) with emphasis on selected trophic state indices such as phytoplankton, phosphorus, nitrogen, silica, chloride, conductivity and chlorophyll. Previous studies by Davis (1964), Schenk and Thompson (1965), Nicholls et al. (1980) and Nicholls (1981) have shown the usefulness of waterworks intake locations for monitoring changes in the nearshore quality of the Great Lakes. These studies have also indicated that water intakes were a cost-effective means of obtaining frequent nearshore water quality data on a year-round basis regardless of lake weather conditions.

Phytoplankton biomass measurements have been made at numerous municipal water supplies in Ontario since 1964. The addition of chemical analyses in 1976, enabled the Ministry to use the phytoplankton data as a means of assessing the effectiveness of phosphorus removal programmes (Nicholls et al. 1977). Reductions in P levels alone do not provide evidence for improved water quality. An associated decline in algal densities and a shift away from certain algal species implicated in the water quality problems of toxicity, odours and filter clogging are needed to show this effect.

The participants at eleven waterworks locations were requested to collect additional water samples on a weekly basis to complement the phytoplankton data already being collected. By 1981 this programme had been expanded to seventeen locations (Figure 1) from Thunder Bay on Lake Superior to Brockville on the St. Lawrence River (Table 1).

The purpose of this report is to provide an update to the previous reports (Hopkins 1977) and (Hopkins 1979), outlining changes in the operation of the programme, since its inception, and to edit and present the data collected to the end of 1981. No attempts have been made to analyse the data for trends at this time. Some long term trend analyses have been previously reported in the references cited above and in Hopkins (1983).

METHODS

Weekly raw water samples were collected from the water treatment plant intake pipes at a point prior to chlorination. This sample was either collected from the low lift well or from a continuously flowing tap in the plant laboratory which was connected to the intake pipe. One litre samples for phytoplankton analyses were preserved, concentrated and counted at six locations (Table 2) by a qualified operator trained by Ministry staff using the Sedgewick-Rafter A.S.U. technique (A.P.H.A. 1975). At the remaining locations, a one litre sample was collected, preserved with 2 mL of Lugol's iodine solution (containing glacial acetic acid) and forwarded to Toronto for concentration and analyses of the phytoplankton with inverted microscopes using the Utermohl method (Utermohl 1958). Aliquots of the concentrated samples were settled in 5 mL Utermohl-type plankton counting chambers, where at least one half the chamber was scanned at 300X for the larger phytoplankters. One to several radii were examined at 600X for smaller forms which were identified to the genus level. Between 200 and 400 "pieces" (cells, filaments or colonies) were counted and measured for each sample, a number that Lund et al. (1968) considered to provide acceptable precision. Phytoplankton biomass at the waterworks locations have been expressed as Areal Standard Units per mL (one A.S.U. is equivalent to 400 square microns of algae) since the algal

related problems of filter clogging and taste and odours at water treatment plants have been historically defined in areal units. For comparison with data expressed as cell volume (mm^3/L or mg/m^3) an appropriate conversion for average values is found in the equations (A.S.U./mL = 476 mm^3/L-55) (Nicholls 1981).

Raw water samples for chemical analyses were collected at the same time and place as the phytoplankton samples, placed in 500 mL polystyrene containers and shipped the same day to one of the Ministry's laboratories (Table 2) for analyses of total (unfiltered) P, soluble reactive P, ammonia-N, total Kjeldahl-N, nitrite-N, nitrate-N, chloride, conductivity and silica (unfiltered reactive silicate). One litre samples of raw water stabilized with 1 mL of a 0.5% magnesium carbonate solution were forwarded to the Ministry laboratories in Toronto or Thunder Bay (Table 2) for chlorophyll a and b analyses. Chemical samples were analyzed according to the methods described in "Outlines of Analytical Methods", (Anon 1975), Laboratory Services Branch, Ministry of the Environment and its subsequent revisions.

During the period 1976-1981 chemical methodology changes were of a minor nature and were implemented primarily to reduce sample analytical times. Inter-laboratory comparison studies completed on duplicate samples for the PLUARG programme during 1978 showed the average bias between laboratories was less than 2% for the above mentioned parameters (D. King, pers. comm.). A large block of chlorophyll data was rejected during the summer of 1977 due to laboratory analytical problems.

RESULTS AND DISCUSSION

Since 1981 all chemical samples submitted for analyses to the Toronto laboratory have been processed by the Laboratory Information System (L.I.S.). These data were subsequently transferred to the

Ministry's computerized Sample Information System (S.I.S.). Original copies of the results of individual sample submissions have been forwarded to each of the participants in the Great Lakes Intake Monitoring Programme. A summary of the first years' data (Hopkins 1977) and a summary of data for the period 1976-1978 (Hopkins 1979) have been reported previously. Since that time the data have been reviewed and edited further and additional phytoplankton data have been added. Data analyzed at locations other than Toronto and all phytoplankton data were excluded from the L.I.S. and S.I.S. files but a mass transfer of all edited data from 1976 to July 1981 was made from the HP9825 system to S.I.S. in September, 1981.

The data have been summarized by location in several formats using an HP 9825 desk-top computer. The raw data (weekly analyses) for twelve parameters with the annual minimum, maximum, mean, standard deviation (±1 S.D.) and number of samples are available as a single page print-out in long or short form (Appendices 1 to 17, part A and B). These data have been converted to monthly means (Appendices 1 to 17, part C) and are available in graphical form as (Appendices 1 to 17, part D and E) with a maximum combination of five locations or parameters per page. Table 3 summarizes the parameter ranges, detection criterion and the maximum and minimum concentration from all 17 locations included in this study from 1976 to 1981.

No attempt has been made to provide an interpretation of the data in this report. The data are provided for the information of the participants in the programme and other agencies which may have use for the data. A brief comment was made on the parameters selected for this study in a presentation to the Chief Operators Conference in 1976 (Hopkins 1976) and this information is repeated here.

<u>Total phosphorus</u> occurs naturally in surface waters and is an element essential to all forms of life. Artificial inputs of phosphorus play a significant role in promoting over-abundance of algae and aquatic plants which may impair water quality. Phosphorus results are used in assessing a water's potential for biological productivity as well as the efficiency of nutrient removal at waste treatment plants. Values in excess of 25 µg/L total P (Anon 1972) may be responsible for excessive algal growths. Although there is no firm criterion for phosphorus, Sawyer (1947) suggested that 300 µg/L of inorganic nitrogen (N) and 10 µg/L of soluble P at the start of the growing season could produce nuisance algal blooms - a guideline which has been substantiated by more recent work. At some of the Great Lakes intake sites there are periods when total P concentrations exceed the 25 µg/L (0.025 mg/L) level.

<u>Nitrogen</u> determinations consist of four components separating the organic nitrogen from the inorganic nitrogen. Briefly, the nitrogen cycle includes a decomposition process from total organic compounds to free ammonia, nitrite, and nitrate, all inorganic forms. Through algal and other plant growth, free ammonia and nitrates may be utilized to regenerate more organic matter. In assessing nutrient parameters in relation to algal growths, a good rule of thumb is to compare the total Kjeldahl nitrogen to the total P. If the algae are utilizing all the nutrients, these two parameters will be present in the ratio of 10-20:1. If the ratio does not fall within this range then N will be in limited supply at higher ratios and P will be limiting at lower ratios. The concentrations of phosphorus and nitrogen are usually minimal in natural run-off. In lakes receiving excessive inputs of sewage and/or agricultural run-off the ratio of N:P will be lower, as will be the ammonia and nitrate components during the summer growth period as a result of algal assimilation of all available inorganic nitrogen. Relative to nitrogen, phosphorus in sewage enriched lakes is often supplied in excess of the requirements for algae.

Conductivity and chloride are used together to measure the salinification of a lake system. These measurements are used to calculate the total dissolved solids which are an approximate measure of the dissolved "salts" in a lake. Chloride is a non-reactive conservative substance which reflects the influence of human activity on a water basin. Chloride concentrations increase as they move down through the Great Lakes system because of increasing road de-icing operations. Urban runoff often contains high concentrations of chloride in winter due to the application of road salt and these may affect readings obtained at waterworks locations. Conductivity is a measure of the ability of a water to carry an electric current and depends on the concentrations of ions in solution to conduct that current. It is so precise and accurate that it is often preferred to a dissolved solids test as an indicator of the dissolved solids content of a natural water sample (Anon 1981).

The element silicon is second only to oxygen in abundance and is present as silica or silicates in sand. The geological deposits in the drainage basin are the source of silicate in Great Lakes waters. Silicates are an essential nutrient for the growth of diatoms, the most common algal type in the Great Lakes and a silica depletion may cause a reduction in algal densities if diatoms are dominant, or perhaps a shift to other algae (e.g. greens or blue-green algae) not requiring SiO_2. Silicon concentrations are measured as the soluble reactive silicate ion expressed as mg Si/L.

Chlorophyll is the natural pigment component of all green plants and is used as an index of the lakes' biological productivity. Chlorophyll *a* and chlorophyll *b* are measured in µg/L quantities. Chlorophyll *a* and *b* are found in the green algae whereas the blue-greens contain only chlorophyll *a*. The chrysophytes including the diatoms and the chrysomonads contain chlorophyll *a* and *c*. Chlorophyll *c* is not measured in the Ministry

laboratory. Chlorophyll b is often very small in relation to chlorophyll a. High chlorophyll values cause greater analytical variability and interpretation of results showing values greater than 20 µg/L should be examined with caution (Anon 1981).

Chlorophyll concentrations may be used as an indicator of eutrophy. Chlorophyll a concentrations less than 2 µg/L will reflect low algal densities and unenriched conditions. Concentrations greater than 4 µg/L will reflect moderately high algal densities and enriched conditions. A single high reading may only reflect a short-lived algal pulse. It should be emphasized that there are many factors which determine the chlorophyll content of algal cells and that chlorophyll measurements provide a simple but only approximate indication of algal biomass.

Phytoplankton biomass measurements and algal taxonomy are also used to provide assessments of water quality in the Great Lakes. The dominance of certain diatom species and low biomass in Lakes Superior and Huron are indicative of oligotrophic waters whereas high algal populations dominated in the summer by blue-green algal pulses reflect the more eutrophic conditions of Lake Erie. Chrysophycean algae are common to some Great Lakes locations and frequently dominate the algal populations in the late spring and early fall. Increases in this group as a percentage of the total biomass have been shown to reflect decreases in P concentrations (Nicholls 1976). With high biomass levels of diatoms in the spring silica concentrations can become a limiting factor thus leaving room for more eutrophic green and blue-green forms to develop later in the season. Diatom populations can be lost from the water quite rapidly by sedimentation but some of the blue-greens are transported great distances. For this reason populations of green and blue-green algae are more noticeable in late summer and early fall when silica levels are at a minimum (Hopkins 1983).

Many of the data collected to date have been used to provide input to individual papers, reports, presentations and summaries which are listed in Appendix 18. The data reported here cover the first six years of the study. Long term trend analyses have not been extensively applied to all the data but a detailed interpretative report has been prepared for the Lake Huron locations (Hopkins, 1983). Reports for locations on Lake Erie and Lake Ontario are in preparation.

ACKNOWLEDGEMENTS

I wish to acknowledge the co-operation of all the water supply personnel who have faithfully collected and submitted the water samples for this study, the laboratory staff for organizing the analyses and results, to Cathy Clarke for data manipulation and to Margaret Barclay for typing the manuscript.

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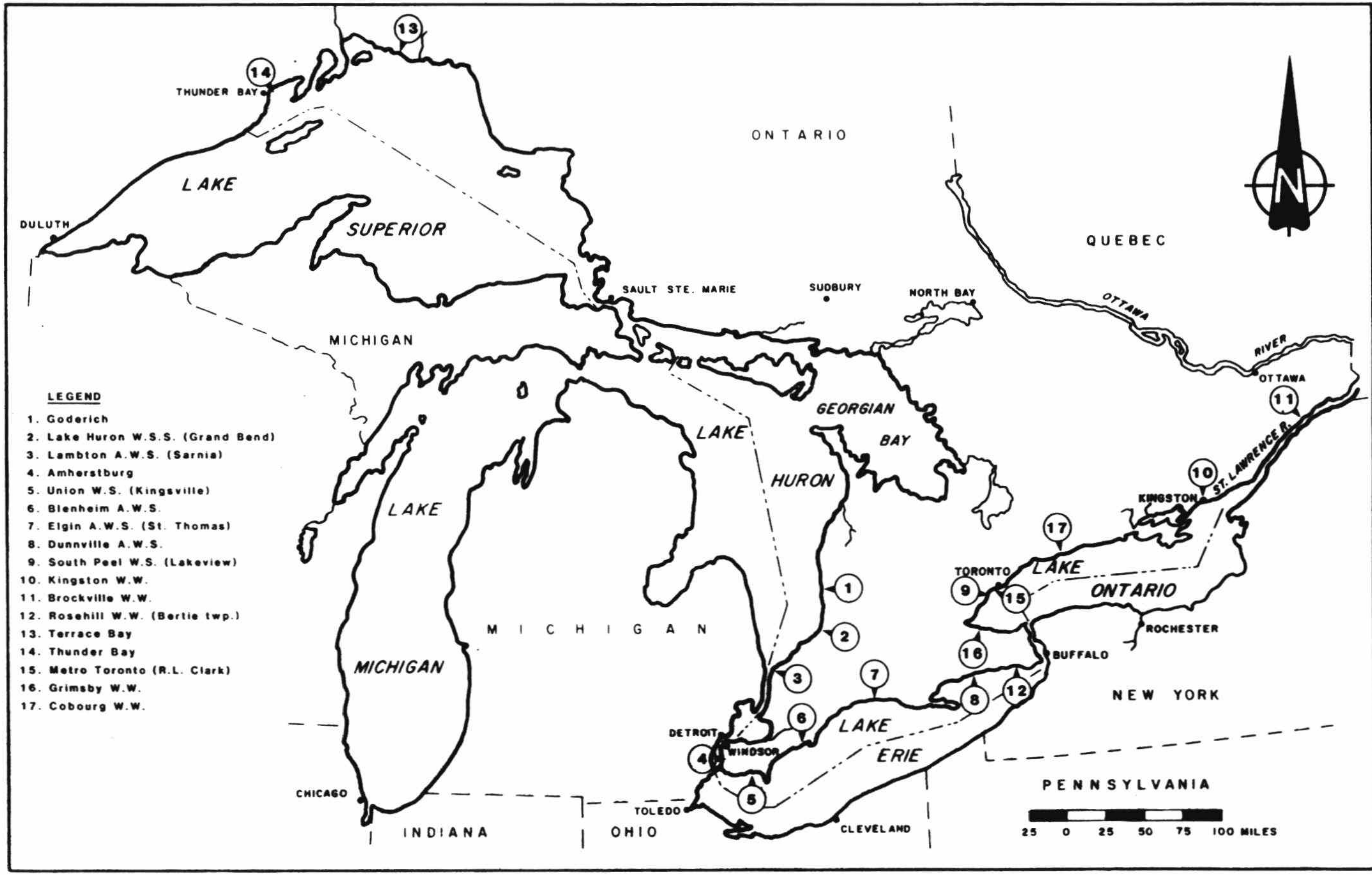

Figure 1: Great Lakes Water Works Intake Monitoring Locations 1976-1981.

Table 1: Participants in Water Intake Monitoring Programme (*MOE Plant)

Plant No.	Name	Lake	Initiation Date
1.	Goderich W.W.*	Lake Huron	Jan./76
2.	Lake Huron W.S.S.*(Grand Bend)	Lake Huron	Jan./76
3.	Lambton Area W.S.S.* (Sarnia)	Lake Huron	Feb./76
4.	Amherstburg A.W.S.*	Detroit River	Jan./76
5.	Union W.S. (Kingsville)	Lake Erie	Jan./76
6.	Blenheim Area W.S.*	Lake Erie	Jan./76
7.	Elgin Area W.S.* (St. Thomas)	Lake Erie	Jan./76
8.	Dunnville Reg'l W.S.*	Lake Erie	Jan./76
9.	South Peel W.S.* (Lakeview)	Lake Ontario	Jan./76
10.	Kingston W.W.	Lake Ontario	Jan./76
11.	Brockville W.W.	St. Lawrence River	Jan./76
12.	Bertie Twp. W.W.	Lake Erie	Sept./78
	(Rosehill Water Plant) Reg'l Mun. of Niagara.		
13.	Terrace Bay W.W.	Lake Superior	May/79
	(Kimberly-Clark Paper Co.)		
14.	Thunder Bay W.W.	Lake Superior	July/79
	(Bare Point Intake)		
15.	Metro Toronto	Lake Ontario	Sept./79
	(R.L. Clark Plant)		
16.	Grimsby W.W.	Lake Ontario	Oct./80
	(Reg'l Mun. of Niagara)		
17.	Cobourg W.W.	Lake Ontario	Oct./80

Table 2: Water Treatment Plant Locations, parameters analyzed and locations of analyses from 1976-81. 1 = S.W. Region Lab. (London); 2 = Central Lab. (Toronto); 3 = S.E. Region Lab. (Kingston); 4 = in W.W. plant; 5 = N.W. Region Lab. (Thunder Bay).

Location		Parameters						
		P	N	Cl	Cond.	Si	Chloro	Phyto
Goderich	'76-'81	1	1	1	1	1	2	4
Grand Bend	'76-'81	1	1	1	1	1	2	4
Sarnia	'76-'81	1	1	1	1	1	2	4
Amherstburg	1976	1	1	1	1	1	2	4
"	1977	2	2	2	2	2	2	4/2
"	'78-'81	2	2	2	2	2	2	2
Union	'76-'81	1	1	1	1	1	2	4
Blenheim	'76-'81	1	1	1	1	1	2	4
Elgin	'76-'81	1	1	1	1	1	2	2
Dunnville	'76-'80	2	2	2	2	2	2	4
"	1981	2	2	2	2	2	2	2
South Peel	'76-'81	2	2	2	2	2	2	4
Kingston	'76-'77	3	3	3	3	2	-	2
"	'78-'81	3	3	3	3	2	2	2
Brockville	'76-'77	3	3	3	3	2	-	2
"	'78-'81	3	3	3	3	2	2	2
Bertie Twp.	'78-'81	2	2	2	2	2	2	-
Terrace Bay	'79-'81	5	5	5	5	5	5	2
Thunder Bay	'79-'81	5	5	5	5	5	5	2
Metro Toronto	'79-'81	2	2	2	2	2	2	2
Grimsby	'80-'81	2	2	2	2	2	2	2
Cobourg	'80-'81	2	2	2	2	2	2	2

Table 3: Summary of parameters, their analytical ranges and detection criterion, and their maximum and minimum concentrations to date in this study*.

Parameter	Range on Undiluted Sample**	Detection Criterion	Concentration 1976-1981	
			Max.	Min.
Total Phosphorus as P	0.004-0.2 mg/L	0.003 mg/L	0.850	<.001
Soluble Reactive Phosphorus as P	0.004-0.100 mg/L	0.0029 mg/L	0.220	<.001
Nitrogen - Free Ammonia	0.007-0.400 mg/L	0.006 mg/L	1.100	<.002
Nitrogen - Total Kjeldahl	0.04 -2.0 mg/L	.036 mg/L	2.450	0.010
Nitrogen - Nitrite (NO_2)	0.001-0.1 mg/L	.002 mg/L	0.335	<.001
Nitrogen - Nitrate (NO_3)	Calculated	-	5.500	<.01
Chloride	0.1 -10 mg/L	0.18 mg/L	49	1.0
Conductivity	<500 µmho/cm	0.3 µmho/cm	560	83
Reactive Silicon	0.09 -5.0 mg/L	0.08 mg/L	3.25	<.02
Chlorophyll a in µg/L	<20 µg/L	N.A.	20.6	<0.1
Chlorophyll b in µg/L	<20 µg/L	N.A.	9.3	<0.1
Phytoplankton Biomass	A.S.U./mL	N.A.	22,569	<1.0

*Great Lakes Intake Monitoring Programme

**In "Outlines of Analytical Methods" Anon 1981.

N.A. - Not applicable

LIST OF APPENDICES

*in 5 parts (A, B, C, D, and E) for Appendices 1-17.

Part A (Append. 1-17): Detailed annual summary of weekly raw water data for twelve parameters at each water treatment plant, 1976-1981.

Part B (Append. 1-17): Short annual summary of weekly raw water data for twelve parameters at each water treatment plant, 1976-1981.

Part C (Append. 1-17): Annual summary of weekly raw water data converted to monthly means (±1 S.D.) for twelve parameters at each water treatment plant, 1976-1981.

Part D (Append. 1-17): Graphical presentation of data as monthly means (±1 S.D.) for five parameters at one location or one parameter for five locations, 1976-1981.

Part E (Append. 1-17): Graphical presentation of data as monthly means (±1 S.D.) for three parameters at one location or one parameter for three locations, 1976-1981.

Appendix 18: Reports, papers and presentations prepared to date based on data collected from the Great Lakes Intake Monitoring Programme.

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Appendix No. 1 for Report:

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Plant # 1 - GODERICH W.T.P. 1976

	Tot.P	F.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
JAN 9	-	-	-	-	-	-	-	-	-	-	-	35
JAN 16	-	-	-	-	-	-	-	-	-	-	-	90
JAN 23	-	-	-	-	-	-	-	-	-	-	-	181
JAN 29	-	-	-	-	-	-	-	-	-	-	-	265
FEB 9	0.020	0.010	0.055	0.415	0.013	1.780	27.0	-	2.35	0.6	-	70
FEB 16	0.027	0.011	0.070	0.455	0.017	2.600	24.0	-	2.40	0.8	-	30
FEB 23	0.043	0.015	0.065	0.430	0.011	1.290	17.5	-	1.70	0.8	-	50
MAR 1	0.035	0.020	0.060	0.505	0.017	1.650	12.0	-	1.90	1.2	0.6	331
MAR 8	0.059	0.027	0.060	0.440	0.015	1.350	10.0	-	1.80	1.6	0.7	258
MAR 15	0.039	0.017	0.045	0.395	0.011	1.460	12.0	-	1.55	2.1	1.3	595
MAR 22	0.053	0.023	0.055	0.360	0.013	1.150	7.5	-	1.15	2.1	0.9	809
MAR 29	0.067	0.024	0.040	0.320	0.009	0.630	7.5	-	1.05	2.2	2.2	629
APR 5	0.037	0.015	0.020	0.375	0.009	0.680	7.0	-	1.10	2.8	0.9	385
APR 12	0.205	0.021	0.040	1.150	0.012	1.010	11.0	-	0.75	25.0	8.4	-
APR 19	0.027	0.007	0.015	0.295	0.003	1.620	7.5	-	0.75	3.6	0.6	701
APR 26	0.071	0.012	0.025	0.535	0.007	0.590	10.0	-	0.70	7.6	-	1388
MAY 3	0.069	0.026	0.035	0.665	0.011	0.880	11.0	-	0.60	12.0	-	904
MAY 17	0.023	0.007	0.010	0.255	0.011	0.460	7.0	-	0.45	7.0	-	433
MAY 25	0.019	0.016	0.000	0.270	0.005	0.240	5.5	-	0.75	2.1	-	729
MAY 31	0.053	0.010	0.015	0.460	0.006	0.090	6.5	-	0.45	3.2	-	357
JUN 7	0.019	0.001	0.040	0.245	0.002	0.170	5.5	-	0.70	4.1	-	752
JUN 14	0.009	0.004	0.025	0.185	0.003	0.230	5.5	-	0.75	0.9	-	261
JUN 21	0.015	0.003	0.025	0.210	0.001	0.160	5.5	-	0.40	2.1	-	401
JUN 28	0.027	0.003	0.015	0.245	0.003	0.270	5.0	-	0.25	1.5	-	-
JUL 6	0.023	0.002	0.015	0.260	0.003	0.260	6.0	-	0.45	2.4	-	-
JUL 12	0.115	0.007	0.025	0.525	0.008	0.100	8.0	-	0.45	10.0	-	330
JUL 19	0.042	0.010	0.025	0.395	0.004	0.000	6.0	-	0.65	4.7	-	189
JUL 26	0.020	0.004	0.020	0.210	0.005	0.210	7.5	-	0.85	8.2	-	240
AUG 3	0.027	0.004	0.015	0.235	0.001	0.190	9.0	-	0.30	-	-	302
AUG 9	0.013	0.001	0.020	0.195	0.003	0.170	13.5	-	0.65	1.4	-	336
AUG 16	0.032	0.006	0.020	0.275	0.001	0.190	6.5	-	0.80	4.4	-	454
AUG 23	0.040	0.003	0.015	0.200	0.002	0.160	6.5	-	0.70	1.1	-	432
AUG 30	0.045	0.004	0.020	0.395	0.003	0.160	6.0	-	1.60	4.9	-	3572
SEP 6	-	-	-	-	-	-	-	-	-	1.6	-	172
SEP 13	0.012	0.004	0.020	0.230	0.007	0.160	6.5	-	0.80	2.7	-	143
SEP 20	0.024	0.005	0.015	0.245	0.003	0.190	7.5	-	0.70	0.5	-	214
SEP 27	0.030	0.009	0.015	0.315	0.004	0.200	13.5	-	0.65	1.7	1.0	-
OCT 5	0.021	0.004	0.015	0.255	0.006	0.140	7.0	-	0.30	1.1	-	449
OCT 13	0.028	0.001	0.015	0.300	0.005	0.180	8.0	-	0.55	2.0	-	470
OCT 18	0.078	0.007	0.020	0.450	0.003	0.210	9.5	-	0.60	4.1	-	-
OCT 25	0.025	0.005	0.020	0.245	0.004	0.240	16.0	-	0.55	5.3	-	189
NOV 1	0.040	0.005	0.020	0.350	0.003	0.340	11.0	-	0.60	3.4	-	101
NOV 8	0.054	0.007	0.020	0.530	0.001	0.260	8.0	-	0.60	3.2	-	340
NOV 15	0.115	0.004	0.005	0.825	0.003	0.290	9.5	-	0.50	5.2	-	131
NOV 22	0.076	0.005	0.020	0.595	0.003	0.530	12.0	-	1.00	3.0	-	-
NOV 29	0.025	0.003	0.020	0.230	0.005	0.380	6.0	-	0.30	4.2	-	357
DEC 6	0.046	0.005	0.015	0.370	0.005	0.700	7.5	-	0.40	1.2	-	403
DEC 13	0.021	0.005	0.015	0.215	0.004	0.770	11.0	-	1.00	1.5	-	170
DEC 20	0.017	0.004	0.010	0.220	0.004	0.530	7.0	-	0.45	1.0	-	224
DEC 29	0.025	0.017	0.100	0.315	0.004	0.610	9.5	-	0.95	0.6	-	-
min.	0.009	0.001	0.000	0.185	0.001	0.000	5.0	-	0.25	0.5	0.6	30
max.	0.205	0.027	0.100	1.150	0.017	2.600	27.0	-	2.40	25.0	8.4	3572
mean	0.042	0.009	0.027	0.372	0.006	0.567	9.4	-	0.88	3.6	1.8	445
s.dev.	0.339	0.337	0.338	0.386	0.337	0.661	4.6	-	0.60	4.1	3.4	556
#samples	45	45	45	45	45	45	45	0	45	45	9	43

Appendix 1 - Part A

Plant # 1 - GODERICH W.T.P. 1977

	Tot.P	F.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
JAN 4	0.011	0.004	0.045	0.120	0.008	0.360	7.0	-	0.75	0.7	0.2	144
JAN 12	0.009	0.003	0.035	0.205	0.001	0.000	8.0	-	0.80	0.8	-	161
JAN 18	0.007	0.004	0.025	0.200	0.001	0.380	10.0	-	0.75	0.4	-	81
JAN 24	0.019	0.008	0.035	0.290	0.003	0.430	11.5	-	0.60	0.9	-	69
FEB 7	0.127	0.113	0.625	0.865	0.007	0.480	18.0	-	0.70	0.4	0.3	11
FEB 14	0.065	0.042	0.245	0.425	0.005	0.570	18.5	-	0.95	0.5	0.4	19
FEB 21	0.059	0.037	0.095	0.380	0.003	0.420	11.0	-	0.60	0.9	0.8	-
FEB 28	0.121	0.053	0.275	0.530	0.006	0.350	21.5	-	0.65	1.0	1.0	-
MAR 7	0.073	0.025	0.110	0.360	0.009	0.490	14.0	-	0.70	0.4	0.2	29
MAR 14	0.208	0.055	0.160	1.020	0.025	3.520	11.5	-	1.50	5.8	2.0	-
MAR 21	0.051	0.031	0.075	0.495	0.015	2.670	15.5	-	1.75	0.4	0.1	64
MAR 28	0.026	0.009	0.020	0.230	0.003	0.750	9.0	-	0.85	0.5	0.5	21
APR 5	0.068	0.010	0.035	0.450	0.008	1.150	7.5	-	0.80	-	-	207
APR 12	0.118	0.027	0.055	0.710	0.014	1.130	9.5	-	0.90	-	-	157
APR 25	0.014	0.005	0.015	0.245	0.005	0.760	9.5	-	0.50	-	-	65
MAY 2	0.027	0.003	0.075	0.335	0.006	0.980	14.0	-	0.40	-	-	324
MAY 9	0.106	0.010	0.020	0.630	0.007	0.580	9.0	-	0.45	-	-	323
MAY 16	0.025	0.003	0.015	0.260	0.003	0.300	8.0	-	0.40	-	-	242
MAY 30	0.006	-	-	0.165	-	-	7.0	-	0.45	-	-	666
JUN 9	0.010	0.003	0.010	0.200	0.003	0.250	6.5	-	0.45	-	-	-
JUN 13	-	0.006	0.005	0.195	0.002	0.280	6.0	-	-	-	-	153
JUN 20	0.011	0.003	0.015	0.180	0.002	0.230	6.0	-	0.35	-	-	182
JUN 27	0.022	0.009	0.015	0.215	0.002	0.200	7.5	-	0.20	-	-	213
JUL 5	0.066	0.007	0.025	0.440	0.003	0.230	5.5	-	0.25	-	-	434
JUL 11	0.011	0.000	0.015	0.220	0.003	0.270	6.0	-	0.35	-	-	194
JUL 18	0.025	0.007	0.015	0.230	0.002	0.220	6.0	-	0.30	-	-	76
JUL 26	0.146	0.007	0.010	0.910	0.002	0.180	8.0	-	0.35	-	-	2319
AUG 2	0.007	0.001	0.010	0.160	0.002	0.200	6.5	-	0.25	-	-	257
AUG 8	0.008	0.003	0.015	0.195	0.003	0.220	6.5	-	0.40	-	-	305
AUG 15	-	-	-	-	-	-	-	-	-	-	-	622
AUG 22	-	-	-	-	-	-	-	-	-	-	-	326
AUG 29	0.034	0.004	0.010	0.230	0.002	0.210	6.0	-	0.40	-	-	189
SEP 6	0.019	0.002	0.015	0.195	0.003	0.300	6.0	216	0.60	-	-	1296
SEP 12	-	-	-	-	-	-	-	234	-	-	-	520
SEP 19	0.021	0.002	0.010	0.285	0.003	0.250	13.0	269	0.40	-	-	122
SEP 26	0.040	0.003	0.010	0.200	0.003	0.290	6.0	223	0.40	-	-	223
OCT 3	0.050	0.015	0.020	0.870	0.011	0.178	10.5	369	1.35	-	-	320
OCT 11	0.070	0.005	0.020	0.525	0.004	0.510	7.0	244	0.80	-	-	391
OCT 17	0.093	0.009	0.015	0.400	0.005	0.930	12.0	239	0.85	-	-	212
OCT 24	0.020	0.007	0.015	0.365	0.003	1.010	16.5	379	0.45	-	-	210
OCT 31	0.012	0.003	0.010	0.250	0.004	0.510	9.5	265	0.45	-	-	226
NOV 8	0.012	0.006	0.025	0.230	0.003	0.410	8.0	252	0.35	1.3	0.7	85
NOV 14	0.031	0.009	0.015	0.250	0.005	0.400	8.0	250	0.45	3.2	1.3	275
NOV 21	0.057	0.009	0.025	0.450	0.005	0.400	6.0	227	0.55	2.8	1.2	545
NOV 28	0.065	0.008	0.015	0.570	0.004	0.400	6.5	233	0.55	4.0	1.0	710
DEC 5	0.096	0.011	0.035	0.720	0.010	1.130	9.5	291	0.90	7.6	4.4	-
DEC 12	0.154	0.012	0.030	1.360	0.008	1.110	12.0	322	0.85	6.3	4.4	580
DEC 19	0.051	0.009	0.030	0.435	0.007	1.460	10.0	334	1.00	2.6	1.8	500
min.	0.006	0.000	0.005	0.120	0.001	0.000	5.5	216	0.20	0.4	0.1	11
max.	0.208	0.113	0.625	1.360	0.025	3.520	21.5	379	1.75	7.6	4.4	2319
mean	0.052	0.014	0.054	0.404	0.005	0.616	9.6	275	0.63	2.1	1.3	327
s.dev.	0.047	0.020	0.105	0.268	0.004	0.648	3.8	52	0.33	2.3	1.3	394
#samples	44	44	44	45	44	44	45	16	44	19	16	43

1-A Cont'd.

Plant # 1 - GODERICH W.T.P. 1978

	Tot.P	F.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
JAN 3	-	-	-	-	-	-	-	-	-	2.5	0.4	334
JAN 9	-	-	-	-	-	-	-	-	-	-	-	252
JAN 16	0.029	0.020	0.060	0.310	0.008	0.300	11.5	255	0.80	0.9	0.2	120
JAN 23	0.028	0.015	0.045	0.300	0.007	0.360	13.0	334	0.35	2.5	2.5	113
JAN 30	0.020	0.011	0.025	0.240	0.005	0.510	7.0	259	0.70	2.0	2.0	52
FEB 6	0.036	0.025	0.115	0.310	0.009	0.500	9.5	263	0.80	1.2	0.9	27
FEB 13	0.018	0.015	0.065	0.640	0.005	0.480	8.0	207	0.65	0.6	0.4	50
FEB 20	0.009	0.006	0.025	0.190	0.003	0.540	8.0	265	0.80	0.6	0.3	59
FEB 27	0.014	0.006	0.055	0.215	0.003	0.430	7.5	265	0.70	0.4	0.3	20
MAR 6	0.009	0.004	0.045	0.185	0.005	0.330	7.5	245	0.60	0.3	0.2	14
MAR 14	0.013	0.013	0.055	0.230	0.003	0.460	9.5	264	0.70	0.4	0.1	48
MAR 20	0.011	0.007	0.040	0.235	0.003	0.710	9.5	297	0.65	0.7	0.4	46
MAR 28	0.039	0.026	0.115	0.535	0.019	3.320	25.0	510	1.45	1.1	0.6	47
APR 3	0.064	0.032	0.120	0.535	0.019	2.690	14.0	392	1.20	2.6	1.5	119
APR 10	0.081	0.027	0.075	0.705	0.016	1.770	8.5	318	1.30	1.9	0.7	107
APR 17	0.033	0.020	0.035	0.450	0.013	2.100	13.5	441	1.20	1.4	0.5	123
APR 24	0.098	0.011	0.025	0.720	0.010	1.520	15.0	417	0.55	3.0	0.2	1222
MAY 1	-	-	-	-	-	-	-	-	-	-	-	636
MAY 8	-	-	-	-	-	-	-	-	-	-	-	-
MAY 15	0.019	0.005	0.010	0.300	0.005	0.560	10.5	291	0.35	2.9	0.3	934
MAY 23	0.018	0.002	0.015	0.190	0.003	0.310	6.0	220	0.40	1.5	0.3	354
MAY 29	0.010	0.001	0.010	0.185	0.003	0.350	6.5	226	0.30	0.9	0.4	241
JUN 5	0.012	0.002	0.015	0.205	0.003	0.290	6.0	221	-	3.2	0.2	534
JUN 12	0.044	0.001	0.020	0.275	0.003	0.310	6.0	217	0.25	1.9	0.6	685
JUN 19	0.014	0.004	0.030	0.170	0.003	0.250	6.0	217	0.40	1.4	0.7	398
JUN 26	0.025	0.100	0.003	0.300	0.008	0.004	6.5	207	0.35	0.8	0.7	265
JUL 4	0.015	0.003	0.015	0.190	0.003	0.120	5.5	215	0.45	2.1	0.3	571
JUL 10	0.076	0.004	0.015	0.505	0.005	0.230	8.0	227	0.45	10.0	0.0	1867
JUL 17	0.021	0.002	0.020	0.255	0.003	0.270	5.0	207	0.65	2.0	0.0	1341
JUL 24	0.007	0.003	0.010	0.185	0.002	0.240	6.5	217	0.45	1.8	0.2	461
AUG 1	0.020	0.005	0.030	0.250	0.003	0.230	8.0	223	0.55	2.7	0.4	1461
AUG 8	0.020	0.003	0.015	0.450	0.003	0.250	9.0	229	0.50	1.1	0.6	177
AUG 15	0.010	0.005	0.025	0.180	0.004	0.240	6.0	216	0.45	0.7	0.6	-
AUG 21	0.023	0.005	0.025	0.235	0.003	0.210	13.0	248	0.60	2.2	0.6	244
AUG 29	0.024	0.004	0.025	0.225	0.001	0.210	13.5	275	0.60	1.3	0.2	576
SEP 5	0.008	0.005	0.025	0.225	0.005	0.220	7.5	221	0.55	1.0	0.5	145
SEP 11	0.013	0.005	0.010	0.205	0.003	0.250	6.0	213	0.60	0.8	0.3	173
SEP 18	0.005	0.001	0.015	0.165	0.003	0.230	11.0	267	0.65	1.5	1.2	283
SEP 26	0.007	0.003	0.010	0.200	0.004	0.330	6.5	227	0.80	8.3	1.7	346
OCT 3	0.014	0.003	0.025	0.190	0.071	0.580	6.0	216	-	1.4	0.4	180
OCT 10	0.025	0.009	0.025	0.225	0.006	0.410	7.5	242	0.75	1.4	0.6	129
OCT 16	0.012	0.003	0.015	0.220	0.011	0.720	8.5	254	0.70	0.9	0.9	98
OCT 23	0.059	0.010	0.025	0.525	0.005	0.520	11.0	254	0.05	3.5	0.6	128
OCT 30	0.027	0.011	0.015	0.225	0.005	0.440	10.0	261	0.58	1.5	0.7	350
NOV 6	0.018	0.003	0.010	0.195	0.003	0.250	6.5	213	0.58	1.6	0.7	214
NOV 14	0.043	0.004	0.015	0.255	0.003	0.240	6.0	219	0.56	2.1	0.9	335
NOV 20	0.069	0.009	0.025	0.450	0.005	0.650	12.0	304	0.30	3.1	0.8	1993
NOV 27	0.018	0.004	0.015	0.275	0.007	1.300	18.0	386	1.30	1.7	0.9	332
DEC 4	0.023	0.004	0.020	0.240	0.003	0.370	5.5	225	0.62	1.6	0.5	1599
DEC 11	0.068	-	-	0.390	-	-	13.0	255	0.48	1.3	1.2	273
DEC 18	0.063	0.009	0.015	0.560	0.003	0.930	8.5	237	0.32	4.0	1.3	469
DEC 25	-	-	-	-	-	-	-	-	-	-	-	-
min.	0.005	0.001	0.003	0.165	0.001	0.004	5.0	207	0.05	0.3	0.0	14
max.	0.098	0.100	0.120	0.720	0.071	3.320	25.0	510	1.45	10.0	2.5	1993
mean	0.028	0.010	0.031	0.307	0.007	0.621	9.2	264	0.66	2.0	0.6	440
s.dev.	0.023	0.016	0.028	0.150	0.011	0.667	3.8	67	0.28	1.8	0.5	496
#samples	47	46	46	47	46	46	47	47	45	48	48	49

1-A Cont'd.

Plant # 1 - GODERICH W.T.P. 1979

	Tot.P	F.R.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
JAN 2	0.021	0.008	0.030	0.285	0.004	1.090	13.0	327	1.22	1.4	0.7	193
JAN 8	0.017	0.005	0.020	0.240	0.003	0.870	9.0	258	0.92	-	-	149
JAN 16	0.015	0.003	0.020	0.240	0.002	0.940	12.0	287	1.06	0.7	0.5	24
JAN 23	0.009	0.007	0.020	0.240	0.003	0.900	12.5	301	1.10	-	-	141
JAN 29	0.033	0.006	0.035	0.310	0.002	0.900	14.5	318	1.16	1.1	1.1	141
FEB 6	0.008	0.001	0.010	0.160	0.001	0.460	8.0	239	0.80	0.4	0.4	49
FEB 12	0.010	0.005	0.025	0.175	0.001	0.610	11.0	268	0.92	0.4	0.3	33
FEB 19	0.013	0.008	0.045	0.185	0.001	0.500	9.0	254	0.82	0.4	0.2	65
FEB 26	0.035	0.024	0.105	0.305	0.002	0.480	14.0	269	0.82	0.4	-	53
MAR 5	0.048	0.043	0.195	0.445	0.004	0.570	16.0	285	0.88	0.6	0.3	53
MAR 12	0.038	0.026	0.100	0.410	0.009	1.970	16.5	346	1.30	-	-	130
MAR 19	0.051	0.023	0.090	0.500	0.020	4.200	32.0	494	2.04	0.9	0.5	23
MAR 27	0.029	0.013	0.035	0.340	0.003	1.590	8.0	233	1.08	1.4	1.4	198
APR 2	0.033	0.015	0.050	0.385	0.009	1.000	10.5	295	1.04	1.3	0.9	-
APR 9	0.088	0.018	0.020	0.590	0.009	2.300	14.0	373	1.22	4.3	3.0	371
APR 16	0.252	0.040	0.055	1.100	0.011	2.090	8.5	282	1.18	2.3	1.3	160
APR 23	0.032	0.011	0.015	0.250	0.008	1.400	9.5	303	0.80	1.6	1.6	278
MAY 1	0.196	0.018	0.015	0.680	0.005	1.500	12.0	348	0.68	2.8	0.6	1345
MAY 7	0.045	0.012	0.015	0.350	0.007	1.100	10.0	303	0.62	1.5	0.8	448
MAY 17	0.018	0.005	0.015	0.230	0.004	0.750	7.5	251	0.48	1.7	0.5	2037
MAY 22	0.020	0.004	0.005	0.210	0.004	0.690	7.0	238	0.48	2.2	0.9	649
MAY 29	0.019	0.001	0.005	0.200	0.003	0.400	7.5	227	0.46	1.8	0.4	948
JUN 4	0.048	0.000	0.000	0.230	0.003	0.270	6.0	223	0.38	1.3	0.5	646
JUN 12	0.016	0.002	0.005	0.190	0.002	0.320	7.0	217	0.46	2.0	1.1	591
JUN 18	0.045	0.005	0.015	0.300	0.004	0.360	8.0	230	0.38	3.0	0.8	946
JUN 25	0.009	0.001	0.015	0.140	0.002	0.330	6.5	220	0.46	1.9	0.8	995
JUL 3	0.016	0.002	0.010	0.220	0.003	0.500	8.0	232	0.52	2.0	0.5	331
JUL 9	0.023	0.001	0.010	0.200	0.003	0.330	6.0	210	0.42	1.8	0.3	286
JUL 16	0.004	0.001	0.010	0.120	0.002	0.280	5.5	221	0.42	0.8	0.5	174
JUL 23	0.011	0.001	0.005	0.150	0.002	0.290	5.5	213	0.40	0.2	0.2	96
JUL 30	0.010	0.001	0.010	0.150	0.001	0.320	6.0	219	0.40	0.9	0.7	74
AUG 7	0.013	0.002	0.010	0.170	0.002	0.280	6.0	215	0.46	1.5	0.5	422
AUG 13	-	-	-	-	-	-	-	216	-	-	-	773
AUG 20	0.017	0.004	0.015	0.150	0.003	0.290	7.0	219	0.52	1.6	1.1	43
AUG 27	0.015	0.001	0.015	0.200	0.002	0.270	7.5	213	0.46	4.8	0.7	63
SEP 4	0.001	0.000	0.010	0.130	0.002	0.240	10.5	231	0.44	0.9	0.4	127
SEP 10	0.001	0.001	0.015	0.220	0.001	0.270	6.5	215	0.72	1.4	0.7	257
SEP 17	0.016	0.001	0.010	0.180	0.002	0.230	6.0	217	0.54	1.8	0.8	215
SEP 24	0.021	0.002	0.005	0.230	0.003	0.220	14.0	253	0.50	1.3	0.4	109
OCT 1	0.071	0.001	0.010	0.200	0.002	0.210	8.0	227	0.44	0.9	0.3	147
OCT 9	0.024	0.004	0.015	0.510	0.003	0.230	17.0	268	0.36	2.0	0.6	272
OCT 15	0.042	0.006	0.015	0.290	0.002	0.240	11.5	250	0.36	1.5	0.4	235
OCT 22	0.022	0.003	0.005	0.160	0.002	0.240	6.0	215	0.50	1.3	0.6	138
OCT 29	0.063	0.005	0.035	0.710	0.025	0.690	11.5	277	0.72	3.4	1.0	205
NOV 5	0.027	0.004	0.015	0.200	0.003	0.490	7.0	234	0.38	1.1	0.9	87
NOV 13	0.025	0.014	0.030	0.280	0.003	0.900	11.5	286	0.62	1.4	0.6	76
NOV 19	0.050	0.002	0.016	0.650	0.004	0.401	6.7	225	0.55	2.0	1.3	66
NOV 26	-	-	-	-	-	-	-	-	-	1.5	0.5	163
DEC 3	0.036	0.006	0.015	0.290	0.006	1.230	7.5	250	0.74	-	-	190
DEC 10	-	-	-	-	-	-	-	-	-	3.3	1.5	308
DEC 17	0.048	0.010	0.015	0.360	0.006	1.600	11.0	302	0.90	1.1	0.6	260
DEC 26	0.119	0.033	0.010	0.380	0.090	3.800	12.0	372	1.78	6.3	0.9	1229
min.	0.001	0.000	0.000	0.120	0.001	0.210	5.5	210	0.36	0.2	0.2	23
max.	0.252	0.043	0.195	1.100	0.090	4.200	32.0	494	2.04	6.3	3.0	2037
mean	0.037	0.008	0.026	0.313	0.006	0.857	10.0	264	0.73	1.7	0.8	335
s.dev.	0.045	0.010	0.034	0.203	0.013	0.860	4.5	55	0.37	1.2	0.5	399
#samples	49	49	49	49	49	49	49	50	49	47	46	51

1-A Cont'd.

Plant # 1 - GODERICH W.T.P. 1980

	Tot.P	F.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
JAN 2	0.035	0.012	0.025	0.350	0.005	1.660	9.5	230	1.20	1.5	1.2	153
JAN 8	0.038	0.008	0.015	0.420	0.003	1.050	7.5	254	0.82	2.5	0.9	247
JAN 14	0.033	0.013	0.020	0.270	0.003	0.600	6.0	227	0.84	1.4	0.9	164
JAN 21	0.049	0.011	0.025	0.480	0.006	1.290	11.5	302	1.02	1.0	0.5	120
JAN 28	0.021	0.009	0.035	0.250	0.004	0.870	9.0	267	0.90	1.8	0.3	42
FEB 4	0.017	0.005	0.020	0.220	0.003	0.850	11.5	278	0.82	1.0	0.2	119
FEB 11	0.011	0.008	0.035	0.210	0.002	0.540	8.0	253	0.74	0.7	0.2	123
FEB 18	0.009	0.003	0.015	0.190	0.001	0.570	10.0	267	0.68	0.8	0.3	203
FEB 25	0.016	0.008	0.045	0.170	0.002	0.460	9.0	244	0.66	0.5	0.4	115
MAR 3	0.009	0.005	0.035	0.180	0.001	0.380	7.0	226	0.68	0.6	0.5	211
MAR 10	0.014	0.006	0.030	0.210	0.001	0.520	11.0	265	0.66	0.6	0.4	84
MAR 17	0.006	0.004	0.015	0.190	0.002	0.850	16.5	323	0.74	0.9	0.5	146
MAR 24	0.156	0.086	0.265	1.120	0.017	2.700	17.5	307	1.36	1.6	1.2	67
MAR 31	0.058	0.031	0.035	0.560	0.014	2.700	10.0	332	1.48	0.8	0.4	114
APR 8	0.026	0.011	0.035	0.220	0.005	1.080	6.5	232	0.80	1.0	0.9	230
APR 14	-	-	-	-	-	-	-	-	-	3.5	0.9	209
APR 21	0.032	0.008	0.010	0.360	0.008	1.830	9.5	321	0.70	2.1	0.5	301
APR 28	0.036	0.009	0.025	0.310	0.007	1.220	8.0	269	0.66	2.1	1.2	652
MAY 5	0.019	0.003	0.010	0.270	0.005	0.960	8.5	255	0.42	2.7	0.7	326
MAY 12	0.017	0.001	0.010	0.230	0.002	0.530	7.0	231	0.34	3.3	0.5	1241
MAY 20	0.008	0.001	0.010	0.190	0.002	0.480	7.5	233	0.26	3.6	0.5	1258
MAY 26	0.011	0.003	0.010	0.200	0.002	0.350	6.5	215	0.38	2.9	1.6	1298
JUN 3	0.006	0.002	0.010	0.190	0.002	0.390	7.5	222	0.28	2.0	0.5	803
JUN 9	0.035	0.004	0.010	0.340	0.004	0.330	7.5	221	0.32	-	-	1160
JUN 16	0.047	0.002	0.005	0.200	0.001	0.270	7.5	218	0.34	2.1	0.6	659
JUN 25	0.006	0.004	0.020	0.140	0.004	0.330	6.5	224	0.30	0.7	0.1	142
JUL 2	0.010	0.002	0.015	0.200	0.002	0.280	8.0	222	0.40	0.8	0.3	268
JUL 7	0.015	0.001	0.015	0.250	0.002	0.250	6.5	213	0.40	2.6	0.3	1116
JUL 14	0.006	0.004	0.015	0.180	0.002	0.210	8.0	224	0.36	1.5	0.7	408
JUL 21	0.009	0.003	0.020	0.150	0.002	0.260	7.0	214	0.34	1.1	0.2	133
JUL 28	0.007	0.002	0.020	0.380	0.003	0.270	10.0	224	0.44	0.8	0.3	61
AUG 5	0.006	0.001	0.005	0.160	0.002	0.260	7.0	212	0.40	0.3	0.1	56
AUG 13	0.180	0.005	0.010	1.140	0.002	0.260	5.5	213	0.58	8.1	2.2	1874
AUG 18	0.007	0.001	0.005	0.160	0.003	0.280	6.0	212	0.54	1.1	0.3	645
AUG 27	0.012	0.003	0.010	0.170	0.002	0.210	6.0	212	0.44	2.8	0.6	63
SEP 2	0.009	0.001	0.010	0.170	0.002	0.240	6.5	211	0.48	1.2	0.4	96
SEP 10	0.033	0.003	0.020	0.330	0.003	0.250	7.0	221	0.58	4.2	1.0	752
SEP 15	0.020	0.003	0.015	0.210	0.002	0.220	13.5	244	0.68	1.2	0.4	243
SEP 24	0.040	0.006	0.020	0.280	0.005	0.290	15.5	256	0.76	1.0	0.5	233
SEP 29	0.024	0.006	0.015	0.250	0.003	0.470	14.0	278	0.86	1.3	0.8	96
OCT 6	0.016	0.004	0.020	0.200	0.003	0.340	14.0	244	0.26	0.8	0.3	214
OCT 14	0.182	0.008	0.015	1.300	0.003	0.430	12.5	262	0.74	2.4	0.9	216
OCT 20	0.040	0.003	0.010	0.450	0.004	1.050	16.0	323	0.92	1.5	0.5	261
OCT 28	0.062	0.004	0.015	0.540	0.005	1.740	15.5	354	1.06	2.1	1.0	304
NOV 3	0.069	0.007	0.005	0.750	0.005	0.900	11.0	281	0.74	0.1	0.6	120
NOV 10	0.053	0.007	0.015	0.420	0.003	1.100	15.5	322	0.78	1.2	0.6	390
NOV 18	0.015	0.004	0.005	0.230	0.003	0.920	14.5	302	0.64	1.4	0.7	463
NOV 24	0.028	0.010	0.010	0.230	0.004	0.650	10.5	254	0.72	0.9	0.6	121
DEC 1	0.034	0.010	0.015	0.210	0.003	0.390	8.0	228	0.66	1.2	0.5	233
DEC 8	0.034	0.013	0.020	0.240	0.004	0.610	10.0	244	0.78	1.3	1.2	77
DEC 15	0.078	0.020	0.025	0.370	0.006	1.030	9.0	260	0.92	3.7	1.3	293
DEC 22	0.036	0.011	0.015	0.310	0.006	1.250	11.0	287	1.02	0.8	0.7	14
min.	0.006	0.001	0.005	0.140	0.001	0.210	5.5	211	0.26	0.1	0.1	14
max.	0.182	0.086	0.265	1.300	0.017	2.700	17.5	354	1.48	8.1	2.2	1874
mean	0.035	0.008	0.023	0.329	0.004	0.726	9.7	255	0.66	1.7	0.6	376
s.dev.	0.040	0.012	0.037	0.249	0.003	0.533	3.3	38	0.28	1.3	0.4	403
#samples	51	51	51	51	51	51	51	51	51	51	51	52

1-A Cont'd.

Plant # 1 - GODERICH W.T.P. 1981

	Tot.P	f.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
JAN 5	0.029	0.009	0.020	0.210	0.002	0.620	8.5	262	0.86	0.6	0.5	29
JAN 12	0.024	0.014	0.045	0.320	0.002	0.730	10.0	263	0.86	0.4	0.3	11
JAN 19	0.016	0.006	0.030	0.260	0.001	0.550	8.5	245	0.66	0.4	0.2	63
JAN 26	0.010	0.004	0.010	0.190	0.001	0.480	8.5	245	0.86	0.6	0.3	46
FEB 2	0.009	0.003	0.015	0.200	0.003	0.810	14.5	298	0.98	0.8	0.4	101
FEB 9	0.009	0.007	0.040	0.240	0.002	0.520	10.0	252	0.82	0.6	0.2	191
FEB 16	0.019	0.002	0.010	0.160	0.002	0.690	13.0	276	0.88	0.6	0.3	74
FEB 23	0.850	0.056	0.005	1.430	0.035	5.500	13.5	365	2.06	2.6	1.0	318
MAR 2	0.045	0.027	0.065	0.640	0.013	4.500	21.5	434	1.88	0.4	0.2	138
MAR 9	0.022	0.012	0.025	0.290	0.007	1.420	8.0	254	0.90	0.5	0.5	96
MAR 16	0.020	0.004	0.015	0.210	0.005	1.500	12.5	287	0.84	1.0	0.3	283
MAR 23	0.023	0.006	0.010	0.230	0.005	1.120	13.0	248	0.72	1.0	0.5	184
MAR 30	0.010	0.001	0.005	0.190	0.004	0.970	6.0	230	0.66	1.3	0.5	440
APR 6	0.081	0.010	0.010	0.540	0.004	1.440	11.5	288	0.60	2.4	1.7	664
APR 13	0.030	0.006	0.010	0.240	0.005	0.930	16.5	294	0.56	1.5	0.6	399
APR 21	0.051	0.007	0.015	0.460	0.002	1.510	14.0	348	0.64	1.2	-	484
APR 27	0.032	0.003	0.000	0.270	0.004	0.850	8.5	260	0.56	0.9	0.6	796
MAY 6	0.095	0.006	0.010	0.570	0.007	1.520	15.5	323	0.44	5.1	1.2	928
MAY 12	0.078	0.006	0.020	0.620	0.007	1.350	14.5	332	0.50	7.5	1.9	912
MAY 20	0.005	0.001	0.005	0.140	0.000	0.310	5.5	216	0.58	0.7	0.2	550
MAY 26	0.013	0.002	0.005	0.230	0.003	0.910	7.5	248	0.42	0.8	0.5	115
JUN 1	0.018	0.001	0.005	0.180	0.001	0.280	6.0	207	0.56	1.0	0.5	279
JUN 8	0.012	0.001	0.005	0.200	0.002	0.350	6.5	214	0.42	1.3	0.8	497
JUN 15	0.011	0.003	0.010	0.450	0.002	0.380	6.0	219	0.34	0.7	0.7	348
JUN 22	0.005	0.000	0.010	0.150	0.000	0.310	6.0	217	0.40	1.0	0.4	249
JUN 29	0.104	0.002	0.005	0.820	0.002	0.290	6.5	212	0.46	2.1	1.2	956
JUL 6	0.020	0.001	0.020	0.270	0.002	0.260	6.0	215	0.44	1.4	0.9	320
JUL 13	0.040	0.002	0.005	0.350	0.002	0.280	6.5	215	0.38	1.0	0.8	1467
JUL 20	0.010	0.003	0.015	0.180	0.003	0.280	6.0	213	0.38	0.3	0.3	178
JUL 27	0.180	0.002	0.015	1.080	0.002	0.580	7.0	226	0.58	1.9	0.6	1946
AUG 4	0.026	0.003	0.010	0.170	0.002	0.260	7.5	216	0.42	0.4	0.3	79
AUG 11	0.010	0.002	0.005	0.200	0.002	0.250	7.5	218	0.48	0.5	0.4	77
AUG 17	0.033	0.001	0.010	0.280	0.001	0.270	6.0	211	0.72	3.4	0.7	726
AUG 24	0.010	0.002	0.015	0.190	0.002	0.260	6.5	210	0.50	0.8	0.3	155
AUG 31	0.012	0.002	0.015	0.170	0.003	0.240	6.0	200	0.54	8.6	1.9	48
SEP 8	0.146	0.002	0.005	0.800	0.003	0.380	8.0	239	0.00	5.7	1.8	2715
SEP 14	0.014	0.003	0.010	0.180	0.002	0.310	6.0	221	0.64	0.7	0.3	79
SEP 22	0.028	0.002	0.015	0.290	0.002	0.370	10.5	245	0.70	2.3	0.1	223
SEP 29	-	-	-	-	-	-	-	-	-	-	-	-
OCT 5	0.061	0.007	0.010	0.500	0.004	0.400	7.5	227	0.60	2.3	0.6	112
OCT 13	0.002	0.001	0.000	0.270	0.001	2.050	17.0	374	1.32	0.8	0.2	154
OCT 20	0.052	0.009	0.010	0.320	0.004	0.750	8.0	249	0.68	1.5	0.3	237
OCT 26	0.026	0.007	0.020	0.590	0.008	3.900	17.5	473	1.56	1.0	0.5	96
NOV 2	0.132	0.005	0.015	0.870	0.007	2.140	18.0	390	0.76	-	-	170
NOV 10	0.042	0.006	0.005	0.460	0.003	0.820	8.5	268	0.54	2.2	0.5	142
NOV 18	0.044	0.005	0.005	0.320	0.003	0.660	10.0	260	0.52	-	-	271
NOV 23	0.026	0.007	0.005	0.260	0.004	0.860	12.5	270	0.76	2.9	0.8	479
NOV 30	-	-	-	-	-	-	-	-	-	3.2	1.0	185
DEC 7	0.059	0.008	0.010	0.430	0.006	1.500	11.0	308	1.02	1.2	0.8	210
DEC 14	0.029	0.011	0.010	0.270	0.002	0.960	8.5	252	0.84	0.6	0.3	146
DEC 22	0.070	0.016	0.020	0.300	0.005	1.240	9.0	274	0.98	0.9	0.5	186
DEC 29	0.040	0.000	0.000	0.400	0.010	0.600	10.0	265	0.80	-	-	285
min.	0.002	0.000	0.000	0.140	0.000	0.240	5.5	200	0.00	0.3	0.1	11
max.	0.850	0.056	0.065	1.430	0.035	5.500	21.5	473	2.06	8.6	1.9	2715
mean	0.055	0.006	0.013	0.372	0.004	0.989	9.9	266	0.71	1.7	0.6	389
s.dev.	0.121	0.009	0.012	0.260	0.005	1.062	3.9	60	0.36	1.8	0.5	498
#samples	50	50	50	50	50	50	50	50	50	48	47	51

I-A Cont'd.

Plant # 1 - GODERICH W.T.P. 1976

	Tot.P	f.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
min.	0.009	0.001	0.000	0.185	0.001	0.000	5.0	-	0.25	0.5	0.6	30
max.	0.205	0.027	0.100	1.150	0.017	2.600	27.0	-	2.40	25.0	8.4	3572
mean	0.042	0.009	0.027	0.372	0.006	0.567	9.4	-	0.88	3.6	1.8	445
s.dev.	0.035	0.007	0.020	0.187	0.004	0.569	4.5	-	0.50	4.1	2.5	556
#samples	45	45	45	45	45	45	45	0	45	45	9	43

Plant # 1 - GODERICH W.T.P. 1977

	Tot.P	f.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
min.	0.006	0.000	0.005	0.120	0.001	0.000	5.5	216	0.20	0.4	0.1	11
max.	0.208	0.113	0.625	1.360	0.025	3.520	21.5	379	1.75	7.6	4.4	2319
mean	0.052	0.014	0.054	0.404	0.005	0.616	9.6	275	0.63	2.1	1.3	327
s.dev.	0.047	0.020	0.105	0.268	0.004	0.648	3.8	52	0.33	2.3	1.3	394
#samples	44	44	44	45	44	44	45	16	44	19	16	43

Plant # 1 - GODERICH W.T.P. 1978

	Tot.P	f.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
min.	0.005	0.001	0.003	0.165	0.001	0.004	5.0	207	0.05	0.3	0.0	14
max.	0.098	0.100	0.120	0.720	0.071	3.320	25.0	510	1.45	10.0	2.5	1993
mean	0.028	0.010	0.031	0.307	0.007	0.621	9.2	264	0.66	2.0	0.6	440
s.dev.	0.023	0.016	0.028	0.150	0.011	0.667	3.8	67	0.28	1.8	0.5	496
#samples	47	46	46	47	46	46	47	47	45	48	48	49

Plant # 1 - GODERICH W.T.P. 1979

	Tot.P	f.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
min.	0.001	0.000	0.000	0.120	0.001	0.210	5.5	210	0.36	0.2	0.2	23
max.	0.252	0.043	0.195	1.100	0.090	4.200	32.0	494	2.04	6.3	3.0	2037
mean	0.037	0.008	0.026	0.313	0.006	0.857	10.0	264	0.73	1.7	0.8	335
s.dev.	0.045	0.010	0.034	0.203	0.013	0.860	4.5	55	0.37	1.2	0.5	399
#samples	49	49	49	49	49	49	49	50	49	47	46	51

Plant # 1 - GODERICH W.T.P. 1980

	Tot.P	f.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
min.	0.006	0.001	0.005	0.140	0.001	0.210	5.5	211	0.26	0.1	0.1	14
max.	0.182	0.086	0.265	1.300	0.017	2.700	17.5	354	1.48	8.1	2.2	1874
mean	0.035	0.008	0.023	0.329	0.004	0.726	9.7	255	0.66	1.7	0.6	376
s.dev.	0.040	0.012	0.037	0.249	0.003	0.583	3.3	38	0.28	1.3	0.4	408
#samples	51	51	51	51	51	51	51	51	51	51	51	52

Plant # 1 - GODERICH W.T.P. 1981

	Tot.P	f.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
min.	0.002	0.000	0.000	0.140	0.000	0.240	5.5	200	0.00	0.3	0.1	11
max.	0.350	0.056	0.065	1.430	0.035	5.500	21.5	473	2.06	8.6	1.9	2715
mean	0.055	0.006	0.013	0.372	0.004	0.989	9.9	266	0.71	1.7	0.6	389
s.dev.	0.235	0.202	0.202	0.329	0.202	1.081	3.9	60	0.42	1.8	0.6	498
#samples	50	50	50	50	50	50	50	50	50	48	47	51

Plant # 1 - GODERICH W.T.P. 1982

	Tot.P	f.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
min.	0.006	0.001	0.005	0.150	0.000	0.250	5.0	211	0.38	0.3	0.0	19
max.	0.304	0.048	0.075	1.090	0.032	3.400	18.5	444	1.76	5.3	2.5	4573
mean	0.040	0.008	0.018	0.361	0.005	0.792	9.3	259	0.77	1.7	0.6	462
s.dev.	0.296	0.292	0.292	0.364	0.292	0.744	3.3	46	0.43	1.3	0.6	745
#samples	48	48	48	48	48	48	48	48	48	48	48	52

1-B Cont'd.

Plant # 1 - GODERICH W.T.P. 1976

		Tot.P	F.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
	No	0	0	0	0	0	0	0	0	0	0	0	4
JAN	m	-	-	-	-	-	-	-	-	-	-	-	143
	SD	-	-	-	-	-	-	-	-	-	-	-	101
	No	3	3	3	3	3	3	3	0	3	3	0	3
FEB	m	0.030	0.012	0.063	0.433	0.014	1.390	22.8	-	2.15	0.73	-	50
	SD	0.012	0.003	0.008	0.020	0.003	0.662	4.0	-	0.39	0.12	-	20
	No	5	5	5	5	5	5	5	0	5	5	5	5
MAR	m	0.051	0.022	0.052	0.404	0.013	1.252	9.8	-	1.49	1.34	1.1	524
	SD	0.013	0.004	0.009	0.072	0.003	0.393	2.3	-	0.38	0.43	0.7	227
	No	4	4	4	4	4	4	4	0	4	4	3	3
APR	m	0.035	0.014	0.025	0.601	0.008	0.975	8.9	-	0.33	9.75	3.3	325
	SD	0.032	0.006	0.011	0.336	0.004	0.466	1.9	-	0.18	10.38	4.4	513
	No	4	4	4	4	4	4	4	0	4	4	0	4
MAY	m	0.041	0.015	0.015	0.413	0.008	0.418	7.5	-	0.56	6.03	-	513
	SD	0.024	0.008	0.015	0.192	0.003	0.344	2.4	-	0.14	4.47	-	245
	No	4	4	4	4	4	4	4	0	4	4	0	3
JUN	m	0.018	0.003	0.026	0.221	0.002	0.208	5.4	-	0.53	2.15	-	471
	SD	0.003	0.001	0.010	0.029	0.001	0.052	0.3	-	0.24	1.39	-	253
	No	4	4	4	4	4	4	4	0	4	4	0	3
JUL	m	0.050	0.006	0.021	0.343	0.005	0.143	6.9	-	0.60	6.33	-	253
	SD	0.044	0.004	0.005	0.142	0.002	0.116	1.0	-	0.19	3.42	-	71
	No	5	5	5	5	5	5	5	0	5	4	0	5
AUG	m	0.032	0.004	0.018	0.260	0.002	0.174	8.3	-	0.91	2.95	-	1029
	SD	0.013	0.002	0.003	0.082	0.001	0.015	3.1	-	0.39	1.98	-	1423
	No	3	3	3	3	3	3	3	0	3	4	1	3
SEP	m	0.022	0.006	0.017	0.263	0.005	0.183	9.2	-	0.72	1.63	1.0	178
	SD	0.009	0.003	0.003	0.045	0.002	0.021	3.3	-	0.08	0.90	-	33
	No	4	4	4	4	4	4	4	0	4	4	0	3
OCT	m	0.038	0.004	0.018	0.313	0.005	0.193	10.1	-	0.63	3.13	-	372
	SD	0.027	0.003	0.003	0.095	0.001	0.043	4.0	-	0.12	1.92	-	159
	No	5	5	5	5	5	5	5	0	5	5	0	4
NOV	m	0.062	0.006	0.017	0.526	0.003	0.360	9.3	-	0.70	3.96	-	267
	SD	0.035	0.002	0.007	0.243	0.001	0.106	2.4	-	0.20	0.79	-	126
	No	4	4	4	4	4	4	4	0	4	4	0	3
DEC	m	0.027	0.008	0.035	0.280	0.004	0.653	8.8	-	0.70	1.08	-	266
	SD	0.013	0.006	0.043	0.076	0.001	0.105	1.8	-	0.32	0.38	-	122

Plant # 1 - GODERICH W.T.P. 1977

		Tot.P	F.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
	No	4	4	4	4	4	4	4	0	4	4	1	4
JAN	m	0.012	0.005	0.035	0.204	0.003	0.293	9.1	-	0.73	0.70	0.2	114
	SD	0.005	0.002	0.008	0.069	0.003	0.197	2.0	-	0.09	0.22	-	46
	No	4	4	4	4	4	4	4	0	4	4	4	2
FEB	m	0.093	0.063	0.310	0.550	0.005	0.455	17.3	-	0.73	0.70	0.6	15
	SD	0.036	0.035	0.224	0.219	0.002	0.093	4.4	-	0.16	0.29	0.3	6
	No	4	4	4	4	4	4	4	0	4	4	4	3
MAR	m	0.090	0.030	0.091	0.526	0.013	1.858	12.5	-	1.20	1.78	0.7	38
	SD	0.081	0.019	0.059	0.346	0.009	1.474	2.9	-	0.50	2.63	0.9	23
	No	3	3	3	3	3	3	3	0	3	0	0	3
APR	m	0.066	0.014	0.035	0.468	0.009	1.013	8.8	-	0.73	-	-	143
	SD	0.052	0.012	0.020	0.233	0.005	0.220	1.2	-	0.21	-	-	72
	No	4	3	3	4	3	3	4	0	4	0	0	4
MAY	m	0.041	0.005	0.037	0.348	0.005	0.620	9.5	-	0.43	-	-	389
	SD	0.044	0.004	0.033	0.201	0.002	0.342	3.1	-	0.03	-	-	189
	No	3	4	4	4	4	4	4	0	3	0	0	3
JUN	m	0.014	0.005	0.011	0.198	0.002	0.240	6.5	-	0.33	-	-	183
	SD	0.007	0.003	0.005	0.014	0.001	0.034	0.7	-	0.13	-	-	30
	No	4	4	4	4	4	4	4	0	4	0	0	4
JUL	m	0.062	0.005	0.016	0.450	0.003	0.225	6.4	-	0.31	-	-	756
	SD	0.061	0.004	0.006	0.323	0.001	0.037	1.1	-	0.05	-	-	1053
	No	3	3	3	3	3	3	3	0	3	0	0	5
AUG	m	0.016	0.003	0.012	0.195	0.002	0.210	6.3	-	0.35	-	-	340
	SD	0.015	0.002	0.003	0.035	0.001	0.010	0.3	-	0.09	-	-	166
	No	3	3	3	3	3	3	3	4	3	0	0	4
SEP	m	0.027	0.002	0.012	0.227	0.003	0.280	8.3	236	0.47	-	-	540
	SD	0.012	0.001	0.003	0.051	0.000	0.026	4.0	24	0.12	-	-	531
	No	5	5	5	5	5	5	5	5	5	0	0	5
OCT	m	0.049	0.008	0.018	0.482	0.005	0.628	11.1	309	0.78	-	-	272
	SD	0.034	0.005	0.004	0.238	0.003	0.342	3.5	61	0.37	-	-	81
	No	4	4	4	4	4	4	4	4	4	4	4	4
NOV	m	0.041	0.008	0.020	0.375	0.004	0.403	7.1	241	0.48	2.83	1.1	404
	SD	0.024	0.001	0.006	0.164	0.001	0.005	1.0	12	0.10	1.13	0.3	278
	No	3	3	3	3	3	3	3	3	3	3	3	2
DEC	m	0.100	0.011	0.032	0.838	0.008	1.233	10.5	316	0.92	5.50	3.5	540
	SD	0.052	0.002	0.003	0.474	0.002	0.197	1.3	22	0.08	2.59	1.5	57

1-C Cont'd.

Plant # 1 - GODERICH W.T.P. 1978

		Tot.P	F.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
	No	3	3	3	3	3	3	3	3	3	4	4	5
JAN	m	0.026	0.015	0.043	0.283	0.007	0.723	10.5	283	0.78	1.93	1.3	177
	SD	0.005	0.005	0.018	0.038	0.002	0.187	3.1	45	0.08	0.75	1.1	116
	No	4	4	4	4	4	4	4	4	4	4	4	4
FEB	m	0.019	0.013	0.065	0.339	0.005	0.488	8.3	250	0.74	0.70	0.5	39
	SD	0.012	0.009	0.037	0.207	0.003	0.046	0.9	29	0.08	0.35	0.3	18
	No	4	4	4	4	4	4	4	4	4	4	4	4
MAR	m	0.018	0.013	0.064	0.296	0.008	1.218	12.9	329	0.85	0.63	0.3	39
	SD	0.014	0.010	0.035	0.161	0.008	1.409	8.1	123	0.40	0.36	0.2	17
	No	4	4	4	4	4	4	4	4	4	4	4	4
APR	m	0.070	0.023	0.064	0.603	0.015	2.020	12.8	392	1.06	2.23	0.7	393
	SD	0.026	0.009	0.043	0.132	0.004	0.506	2.9	53	0.34	0.71	0.6	553
	No	3	3	3	3	3	3	3	3	3	3	3	4
MAY	m	0.016	0.003	0.012	0.225	0.004	0.407	7.7	246	0.35	1.77	0.3	666
	SD	0.005	0.002	0.003	0.065	0.001	0.134	2.5	39	0.05	1.03	0.1	310
	No	4	4	4	4	4	4	4	4	3	4	4	4
JUN	m	0.024	0.027	0.017	0.238	0.004	0.214	6.1	216	0.33	1.83	0.6	471
	SD	0.015	0.049	0.011	0.060	0.003	0.142	0.3	6	0.08	1.02	0.2	180
	No	4	4	4	4	4	4	4	4	4	4	4	4
JUL	m	0.030	0.003	0.015	0.284	0.003	0.215	6.3	217	0.50	3.98	0.1	1060
	SD	0.031	0.001	0.004	0.151	0.001	0.066	1.3	8	0.10	4.02	0.2	665
	No	5	5	5	5	5	5	5	5	5	5	5	4
AUG	m	0.019	0.004	0.024	0.268	0.003	0.228	9.9	238	0.54	1.60	0.5	615
	SD	0.006	0.001	0.005	0.105	0.001	0.018	3.2	24	0.07	0.82	0.2	591
	No	4	4	4	4	4	4	4	4	4	4	4	4
SEP	m	0.008	0.004	0.015	0.199	0.004	0.258	7.8	232	0.65	2.90	0.9	238
	SD	0.003	0.002	0.007	0.025	0.001	0.050	2.3	24	0.11	3.61	0.6	95
	No	5	5	5	5	5	5	5	5	4	5	5	5
OCT	m	0.027	0.007	0.021	0.277	0.020	0.534	8.6	245	0.52	1.74	0.6	177
	SD	0.019	0.004	0.005	0.139	0.029	0.124	2.0	18	0.32	1.01	0.2	101
	No	4	4	4	4	4	4	4	4	4	4	4	4
NOV	m	0.037	0.005	0.016	0.294	0.005	0.610	10.6	282	0.81	2.13	0.8	344
	SD	0.024	0.003	0.006	0.110	0.002	0.498	5.6	80	0.34	0.68	0.1	812
	No	3	2	2	3	2	2	3	3	3	3	3	3
DEC	m	0.051	0.007	0.018	0.397	0.003	0.650	9.0	239	0.64	2.47	1.0	780
	SD	0.025	0.004	0.004	0.160	0.000	0.396	3.8	15	0.17	1.33	0.4	716

1-C Cont'd.

Plant # 1 - GODERICH W.T.P. 1979

		Tot.P	F.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
	No	5	5	5	5	5	5	5	5	5	3	3	5
JAN	m	0.019	0.006	0.025	0.263	0.003	0.940	12.2	298	1.09	1.07	0.8	130
	SD	0.009	0.002	0.007	0.033	0.001	0.037	2.0	27	0.11	0.35	0.3	63
	No	4	4	4	4	4	4	4	4	4	4	3	4
FEB	m	0.017	0.010	0.045	0.206	0.001	0.513	10.5	258	0.84	0.40	0.4	63
	SD	0.013	0.010	0.042	0.067	0.001	0.067	2.5	14	0.05	0.00	0.2	15
	No	4	4	4	4	4	4	4	4	4	3	3	4
MAR	m	0.042	0.028	0.105	0.424	0.010	2.033	18.1	352	1.33	0.97	0.7	102
	SD	0.010	0.012	0.066	0.067	0.007	1.530	10.0	99	0.51	0.40	0.6	78
	No	4	4	4	4	4	4	4	4	4	4	4	3
APR	m	0.101	0.021	0.035	0.581	0.009	1.398	10.6	313	1.06	2.38	1.7	270
	SD	0.104	0.013	0.020	0.373	0.001	0.390	2.4	41	0.19	1.35	0.9	106
	No	5	5	5	5	5	5	5	5	5	5	5	5
MAY	m	0.060	0.008	0.011	0.334	0.005	0.888	8.8	273	0.54	2.00	0.6	1035
	SD	0.077	0.007	0.005	0.203	0.002	0.423	2.1	51	0.10	0.51	0.2	630
	No	4	4	4	4	4	4	4	4	4	4	4	4
JUN	m	0.030	0.002	0.009	0.215	0.003	0.320	6.9	223	0.42	2.05	0.8	795
	SD	0.020	0.002	0.008	0.068	0.001	0.037	0.9	6	0.05	0.70	0.2	205
	No	5	5	5	5	5	5	5	5	5	5	5	5
JUL	m	0.013	0.001	0.009	0.168	0.002	0.344	6.2	219	0.43	1.14	0.4	192
	SD	0.007	0.000	0.002	0.041	0.001	0.090	1.0	9	0.05	0.75	0.2	114
	No	3	3	3	3	3	3	3	4	3	3	3	4
AUG	m	0.015	0.002	0.013	0.173	0.002	0.280	6.8	217	0.48	2.63	0.8	325
	SD	0.002	0.002	0.003	0.025	0.001	0.010	0.8	2	0.03	1.88	0.3	345
	No	4	4	4	4	4	4	4	4	4	4	4	4
SEP	m	0.010	0.001	0.010	0.190	0.002	0.240	9.3	229	0.55	1.35	0.6	177
	SD	0.010	0.001	0.004	0.045	0.001	0.022	3.8	18	0.12	0.37	0.2	71
	No	5	5	5	5	5	5	5	5	5	5	5	5
OCT	m	0.044	0.004	0.016	0.374	0.007	0.322	10.8	247	0.48	1.82	0.6	199
	SD	0.022	0.002	0.011	0.232	0.010	0.206	4.2	26	0.15	0.97	0.3	57
	No	3	3	3	3	3	3	3	3	3	4	4	4
NOV	m	0.034	0.007	0.020	0.377	0.003	0.597	8.4	248	0.52	1.50	0.8	93
	SD	0.014	0.006	0.008	0.240	0.001	0.266	2.7	33	0.12	0.37	0.4	44
	No	3	3	3	3	3	3	3	3	3	3	3	4
DEC	m	0.068	0.016	0.013	0.510	0.034	2.227	10.2	308	1.14	3.57	1.0	497
	SD	0.045	0.015	0.003	0.322	0.048	1.372	2.4	61	0.56	2.61	0.5	491

1-C Cont'd.

Plant # 1 - GODERICH W.T.P. 1980

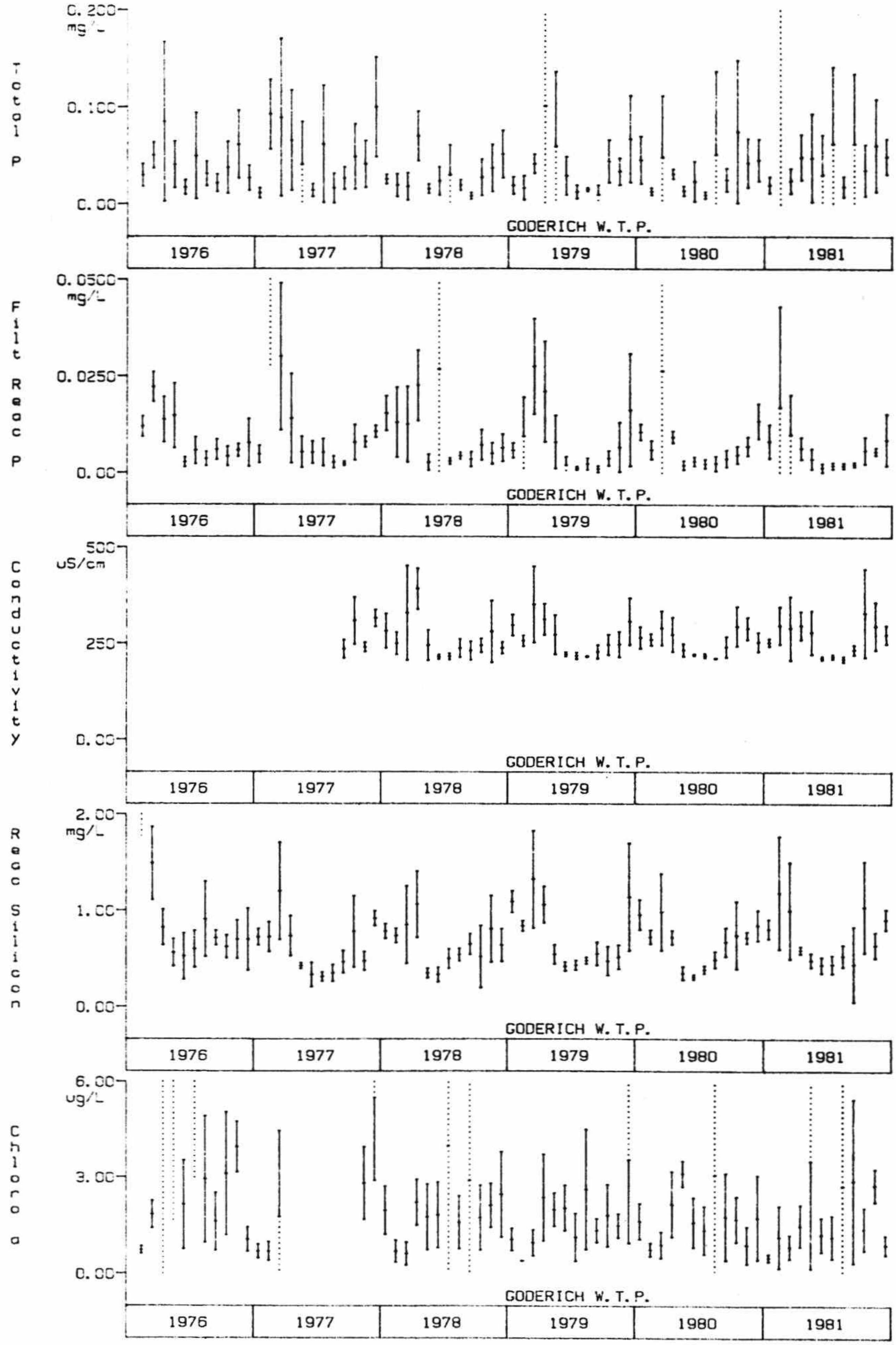
		Tot.P	F.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
	No	5	5	5	5	5	5	5	5	5	5	5	5
JAN	m	0.045	0.011	0.024	0.354	0.004	1.094	8.7	265	0.95	1.64	0.8	115
	SD	0.025	0.002	0.007	0.098	0.001	0.405	2.1	28	0.16	0.56	0.4	74
	No	4	4	4	4	4	4	4	4	4	4	4	4
FEB	m	0.013	0.006	0.029	0.198	0.002	0.605	9.6	261	0.73	0.75	0.3	141
	SD	0.004	0.002	0.014	0.022	0.001	0.170	1.5	15	0.07	0.21	0.1	45
	No	5	5	5	5	5	5	5	5	5	5	5	5
MAR	m	0.049	0.026	0.086	0.452	0.007	1.430	12.4	291	0.98	0.90	0.6	124
	SD	0.064	0.035	0.103	0.406	0.008	1.172	4.5	44	0.40	0.41	0.3	57
	No	3	3	3	3	3	3	3	3	3	4	4	4
APR	m	0.031	0.009	0.023	0.297	0.007	1.377	8.0	274	0.72	2.18	0.9	348
	SD	0.005	0.002	0.013	0.071	0.002	0.399	1.5	45	0.07	1.02	0.3	206
	No	4	4	4	4	4	4	4	4	4	4	4	4
MAY	m	0.014	0.002	0.010	0.223	0.003	0.530	7.4	234	0.35	3.13	0.3	1156
	SD	0.005	0.001	0.000	0.036	0.002	0.264	0.9	16	0.07	0.40	0.5	221
	No	4	4	4	4	4	4	4	4	4	3	3	4
JUN	m	0.024	0.003	0.011	0.218	0.003	0.330	7.3	221	0.31	1.60	0.4	591
	SD	0.021	0.001	0.006	0.036	0.002	0.049	0.5	3	0.03	0.78	0.3	422
	No	5	5	5	5	5	5	5	5	5	5	5	5
JUL	m	0.009	0.002	0.017	0.232	0.002	0.254	7.9	219	0.39	1.36	0.4	408
	SD	0.004	0.001	0.003	0.090	0.000	0.027	1.3	5	0.04	0.75	0.2	415
	No	4	4	4	4	4	4	4	4	4	4	4	4
AUG	m	0.051	0.003	0.008	0.408	0.002	0.253	6.1	212	0.49	3.08	0.8	560
	SD	0.086	0.002	0.003	0.488	0.001	0.030	0.6	1	0.08	3.51	1.0	355
	No	5	5	5	5	5	5	5	5	5	5	5	5
SEP	m	0.025	0.004	0.016	0.258	0.003	0.294	11.3	242	0.67	1.78	0.6	234
	SD	0.012	0.002	0.004	0.080	0.001	0.102	4.2	27	0.15	1.36	0.3	270
	No	4	4	4	4	4	4	4	4	4	4	4	4
OCT	m	0.075	0.005	0.015	0.623	0.004	0.903	14.5	295	0.75	1.70	0.7	249
	SD	0.074	0.002	0.004	0.474	0.001	0.637	1.6	51	0.35	0.71	0.3	43
	No	4	4	4	4	4	4	4	4	4	4	4	4
NOV	m	0.043	0.007	0.009	0.403	0.004	0.393	12.9	290	0.72	0.90	0.6	275
	SD	0.025	0.002	0.005	0.245	0.001	0.185	2.5	29	0.06	0.58	0.1	181
	No	4	4	4	4	4	4	4	4	4	4	4	4
DEC	m	0.046	0.014	0.019	0.283	0.005	0.320	9.5	255	0.85	1.75	0.9	154
	SD	0.022	0.005	0.005	0.072	0.002	0.391	1.3	25	0.16	1.32	0.4	131

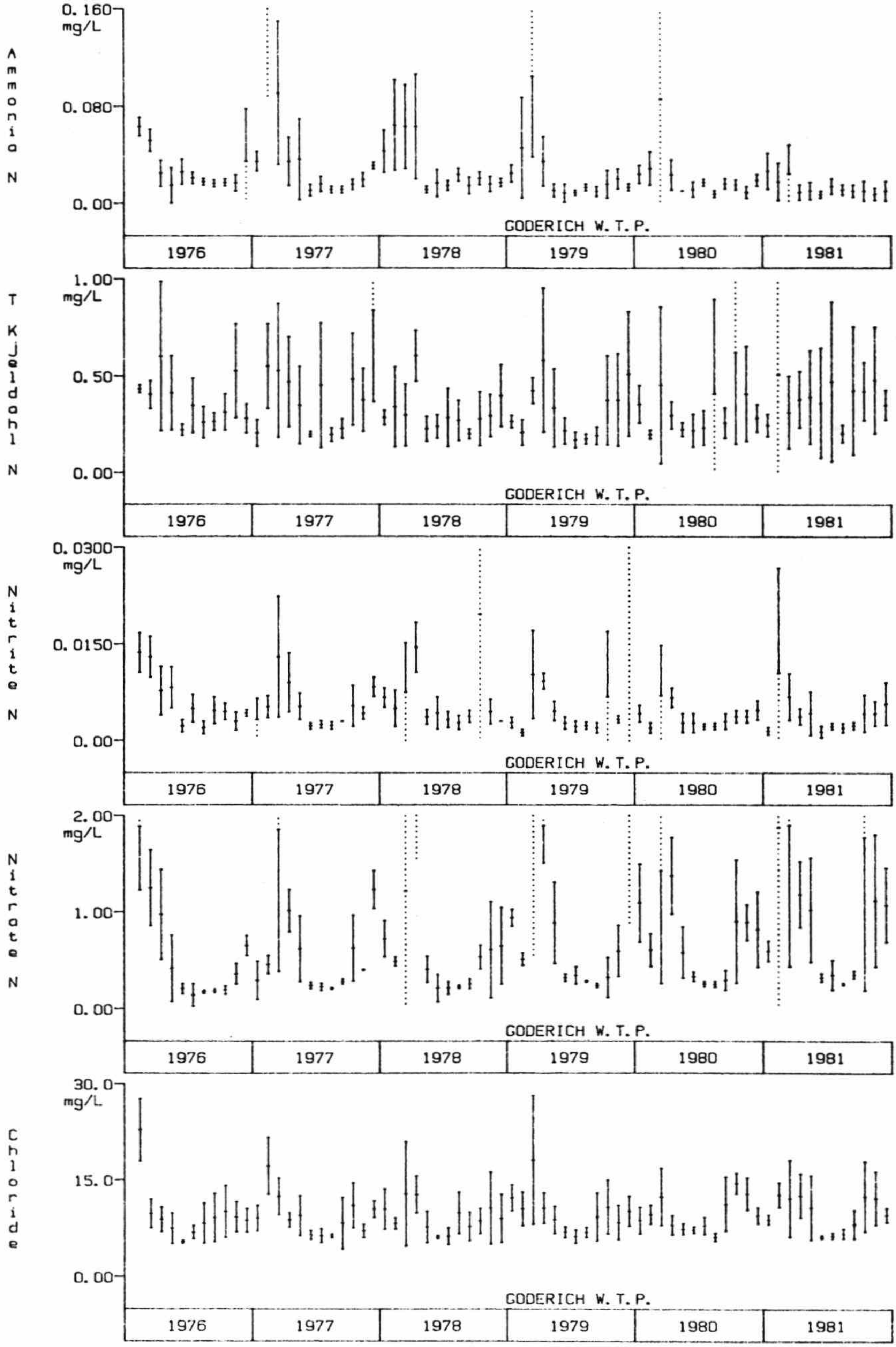
1-C Cont'd.

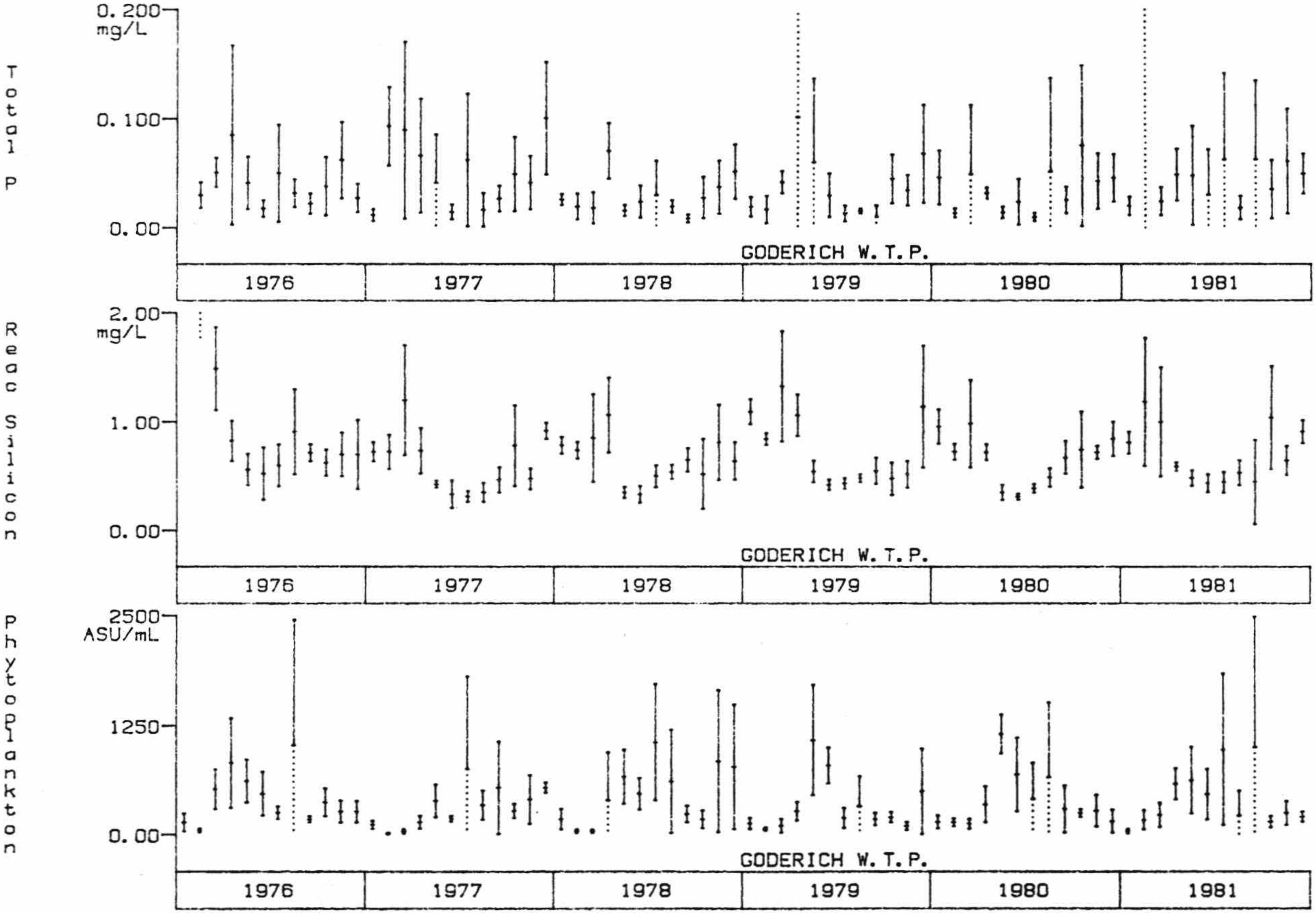
Plant # 1 - GODERICH W.T.P. 1981

		Tot.P	F.r.P	NH3	T.Kjl	NO2	NO3	Cl	Cond	R.Sil	Chl a	Chl b	Phyto
	No	4	4	4	4	4	4	4	4	4	4	4	4
JAN	m	0.020	0.008	0.026	0.245	0.002	0.595	8.9	254	0.31	0.50	0.3	37
	SD	0.008	0.004	0.015	0.058	0.001	0.107	0.8	10	0.10	0.12	0.1	22
	No	4	4	4	4	4	4	4	4	4	4	4	4
FEB	m	0.222	0.017	0.018	0.508	0.011	1.880	12.3	298	1.19	1.15	0.5	171
	SD	0.419	0.026	0.016	0.616	0.016	2.416	1.9	49	0.59	0.97	0.1	110
	No	5	5	5	5	5	5	5	5	5	5	5	5
MAR	m	0.024	0.010	0.024	0.312	0.007	1.902	12.2	291	1.00	0.84	0.4	223
	SD	0.013	0.010	0.024	0.137	0.004	1.463	6.0	83	0.50	0.38	0.1	137
	No	4	4	4	4	4	4	4	4	4	4	3	4
APR	m	0.049	0.007	0.009	0.378	0.004	1.183	12.6	298	0.59	1.50	1.0	586
	SD	0.024	0.003	0.006	0.146	0.001	0.341	3.4	37	0.04	0.65	0.6	173
	No	4	4	4	4	4	4	4	4	4	4	4	4
MAY	m	0.048	0.004	0.010	0.390	0.004	1.023	10.8	280	0.49	3.53	1.0	626
	SD	0.045	0.003	0.007	0.240	0.003	0.540	5.0	57	0.07	3.35	0.8	383
	No	5	5	5	5	5	5	5	5	5	5	5	5
JUN	m	0.030	0.001	0.007	0.360	0.001	0.322	6.2	214	0.44	1.22	0.7	455
	SD	0.042	0.001	0.003	0.284	0.001	0.042	0.3	5	0.08	0.54	0.3	290
	No	4	4	4	4	4	4	4	4	4	4	4	4
JUL	m	0.063	0.002	0.014	0.470	0.002	0.350	6.4	217	0.45	1.15	0.7	978
	SD	0.079	0.001	0.006	0.413	0.001	0.154	0.5	6	0.09	0.68	0.3	366
	No	5	5	5	5	5	5	5	5	5	5	5	5
AUG	m	0.013	0.002	0.011	0.202	0.002	0.256	6.7	211	0.53	2.74	0.7	217
	SD	0.011	0.001	0.004	0.045	0.001	0.011	0.8	7	0.11	3.50	0.7	237
	No	3	3	3	3	3	3	3	3	3	3	3	3
SEP	m	0.063	0.002	0.010	0.423	0.002	0.353	8.2	235	0.45	2.90	0.7	1006
	SD	0.073	0.001	0.005	0.331	0.001	0.038	2.3	12	0.39	2.55	0.9	1432
	No	4	4	4	4	4	4	4	4	4	4	4	4
OCT	m	0.035	0.006	0.010	0.420	0.004	1.775	12.5	331	1.04	1.40	0.4	150
	SD	0.027	0.003	0.008	0.150	0.003	1.585	5.5	115	0.47	0.67	0.2	63
	No	4	4	4	4	4	4	4	4	4	3	3	5
NOV	m	0.061	0.006	0.008	0.478	0.004	1.120	12.3	297	0.65	2.77	0.8	249
	SD	0.048	0.001	0.005	0.275	0.002	0.685	4.2	62	0.13	0.51	0.3	137
	No	4	4	4	4	4	4	4	4	4	3	3	4
DEC	m	0.050	0.009	0.010	0.350	0.006	1.075	9.6	275	0.91	0.90	0.5	207
	SD	0.018	0.007	0.008	0.077	0.003	0.386	1.1	24	0.11	0.30	0.3	58

Appendix 1 - Part D




0.160
mg/L
0.080
0.00
Ammonia N
GODERICH W.T.P.
1976
1977
1978
1979
1980
1981
1.00
mg/L
0.50
0.00
T Kjeldahl N
GODERICH W.T.P.
1976
1977
1978
1979
1980
1981
0.0300
mg/L
0.0150
0.00
Nitrite N
GODERICH W.T.P.
1976
1977
1978
1979
1980
1981
2.00
mg/L
1.00
0.00
Nitrate N
GODERICH W.T.P.
1976
1977
1978
1979
1980
1981
30.0
mg/L
15.0
0.00
Chloride
GODERICH W.T.P.
1976
1977
1978
1979
1980
1981


Total P
0.200 mg/L
0.100
0.00
GODERICH W.T.P.
1976
1977
1978
1979
1980
1981
Reac Silicon
2.00 mg/L
1.00
0.00
GODERICH W.T.P.
1976
1977
1978
1979
1980
1981
Phytoplankton
2500 ASU/mL
1250
0.00
GODERICH W.T.P.
1976
1977
1978
1979
1980
1981